centrations and to favorably affect outcome. Charcoal should be used in virtually all overdose cases; most tested chemicals and drugs are adsorbed, and there are few contraindications. Charcoal should be avoided if it adsorbs an orally given antidote used in a specific poisoning. Adsorption of orally administered acetylcysteine by charcoal has been suggested in one study, but was seemingly absent in another. Until this is clarified activated charcoal should probably be withheld in major acetaminophen overdoses. Likewise, charcoal will adsorb orally administered ethanol, and thus should be withheld in methanol and ethylene glycol overdose.

Charcoal palatability can be increased by the addition of sorbitol or saccharin, the latter of which can be used in a 1:20 dilution and thus not increase total volume of charcoal that has to be swallowed.

Cathartics have not been proved to be beneficial in overdose cases, but recent studies show that at least in some cases they actually increase the adsorptive capacity of charcoal. Magnesium cathartics, in particular, increase cathartic removal of salicylates and several other substances.

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Coelenterate (Man-of-War) Envenomation

RECREATIONAL AND INDUSTRIAL PURSUITS in coastal tropical waters have increased the number of envenomations inflicted by coelenterates (cnidarians) on humans. The most frequent offenders are *Physalia physalis,* the Atlantic Portuguese man-of-war, and *Physalia utriculus* (bluebottle), the Pacific version. These predators are free-swimming, pelagic organisms composed of a nitrogen and carbon monoxide-filled sail (pneumatophore) up to 30 cm long from which are suspended nematocyst (venom organelle)-laden tentacles. These tentacles may be numerous and measure up to 30 m (100 ft) in length *(P physalis).* When the animal moves in the ocean, these structures coil and fold to produce stinging "batteries," which may involve more than a million nematocyts.

Nematocyst venom includes toxic fractions that can invoke any and all of anaphylaxis, muscle spasm, exquisite pain and neurologic-cardiovascular collapse. Venom components include adenosinetriphosphatase, fibrinolysin, hyaluronidase, histamine, peripheral calcium antagonists, myocardial depressants, hemolysins and dermatonecrotic agents. Milder envenomation may provoke only an irritant dermatitis, whereas severe stings may induce generalized multisystem failure.

The immediate therapy for coelenterate stings is gentle topical application of isopropyl alcohol (40 percent) or acetic acid (5 percent). Fresh water or abrasion will discharge unexploded nematocysts and should be avoided. Following the initial detoxification, the remaining organelles can be removed by shaving the affected area. All patients should receive appropriate tetanus prophylaxis. Muscle spasm and pain are controlled with the administration of calcium gluconate and narcotics, respectively. Severe envenomations may require advanced life support. Washed-up tentacle fragments can retain activity for months. In children who ingest these, acute airway obstruction may develop from local oropharyngeal edema. Prompt detoxification and airway management is often lifesaving. Steroid administation has not been shown to be of definitive benefit.

There is not yet an effective antivenin for the sting of *Physalia,* as there is for *Chironex fleckeri* (box-jelly or sea wasp). The increased incidence of envenomations has provided impetus for a growing interest in the development of such an agent.

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Mechanism of Blood Flow During Cardiopulmonary Resuscitation

CARDIOPULMONARY RESUSCITATION (CPR) is a therapeutic method that over the past 20 years has proved to be the critical first component in the management of sudden cardiac death. New concepts and controversies have recently been generated regarding the mechanism of blood flow during CPR: The central issue and major controversy is whether blood flow results from compression of the heart between the sternum and spine, as initially espoused by Kouwenhoven and colleagues, or whether antegrade flow is primarily due to the generalized rise in intrathoracic pressure that occurs during the act of chest compression, as suggested by animal and human investigations at Johns Hopkins University, the University of California, the Baylor College of Medicine and the University of Washington.

According to the latter theory, blood flow during CPR results from rhythmic increases in intrathoracic pressure during chest compression. The increase in intrathoracic pressure is transmitted directly to the extrathoracic arterial bed but, due to closure of venous valves, not to the peripheral venous system. A peripheral arterial-to-venous perfusion gradient is thus established that facilitates blood flow. This theory is supported by the finding that pressures in the cardiac chambers and ascending aorta rise to a level equal to the change in intrapleural pressure during chest compression. (If selective cardiac compression were to occur, ventricular pressures would exceed atrial pressures). In addition, cineangiographic studies in animals and two-dimensional echocardiographic studies in hu-